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Buckled Membranes in Mixed-valence Ionic Amphiphile Vesicles Analyzed by X-ray Scattering

Cheukyui Leung, Megan Greenfield, Liam Palmer, Graziano Vernizzi, Michael Bedzyk, Monica Olvera de la Cruz, and Samuel Stupp

Northwestern University, Evanston, IL 60208

We demonstrate that charged amphiphilic molecules, including molecules with biological motifs, organize into non-spherical shapes expected for elastic membranes. Specifically, we demonstrate that anionic (-1) water insoluble amphiphiles and cationic amphiphiles (+3) (which form micelles in water), can co-assemble into small buckled vesicles [1]. The strong electrostatic interaction between the +3 and -1 head groups increases the cohesion energy of the amphiphiles and favors the formation of two-dimensional, flat ionic domains on the vesicle surface, resulting in edges and a buckled shape. Small-angle x-ray scattering/wide angle x-ray scattering (WAXS) experiments were conducted in APS 5-ID-D. WAXS measurements confirm the presence of crystalline domains induced by these ionic correlations.

1. *J. Am. Chem. Soc.*, **131**, 2030–2031 (2009).